

Eye Alert System

EA401/EA402

USER MANUAL



Version 11.11.27

I. Product introduction



The EA401/EA402 driver fatigue alarm system is the most advanced non-contact method to capture infrared images of people's eyes and the PERCLOS algorithms alerts the driver in time to protect your life and property.

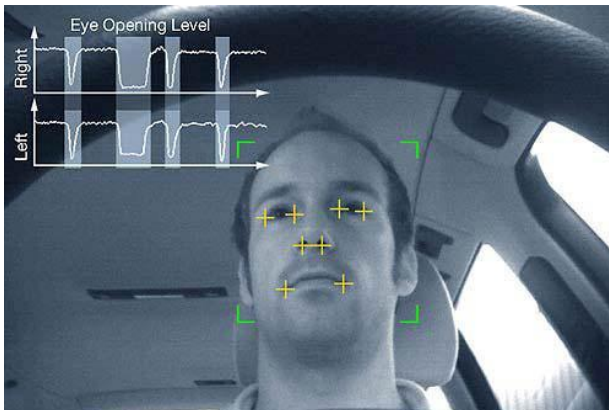
EA401/EA402 is small and intelligent, it does not block your vision, the base rotates as needed, the installation is very easy, and it can be installed right on the dashboard. The EA401/EA402 has a highly integrated infrared camera, a computer, image processing unit and alarm. The EA401/EA402 technology is protected by over ten patents.

II. Alarm theory

A driver may not be aware that they are in danger due to fatigue. A driver might feel they must continue driving. Our driver fatigue alarm system reminds the driver that he/she is in a dangerous state. The EA401/EA402 uses a PERCLOS algorithm to analyze the driver's fatigue level.

The state of the driver's eyes is constantly analyzed. The human retina reflects infra-red light in a manner that can be used to determine the eye's condition. This varies just prior to falling asleep. The EA401/EA402 knows you are falling asleep before you close your eyes.

If the EA401/EA402 determines the driver is in a dangerous state a sharp voice will alert the driver.



III. Features

- Works around the clock, both in the dark or the sun.
- Works with sunglasses or prescription glasses.
- Leading face recognition technology, patented PERCLOS algorithms to warn the driver.
- Patented mesh membrane pupil detection technology detects open but sleepy eyes.
- In addition to fatigue driving, if the driver does not focus on driving the system will respond.
- Intelligent high-speed recognition, the system can identify when you are in an urban areas or on the expressway, the system will automatically raise the alarm sensitivity on expressway.
- Compact, easy to install, will not affect the driver's field of view.
- Automatic sensitivity control, when the driver barely moves, the system will automatically raise the sensitivity. If he often turns his head, the alarm sensitivity will be automatically lowered, to reduce false alarms.
- Facial feedback indicator, the green light is on when the angle between lens and human face is proper.

Model	Data-Out when On	Data-Out When Off	Data-Out When Alarm, 15 seconds max
EA401	0V	0V	3.3V
EA402	3.3V	0V	0V

IV. Functional process

Two seconds after power is turned on, the green light will flash. At night the red infrared LED can also be seen. After 30 seconds, the system goes into the active state. The green light means your eyes are open, the light is off when your eyes closed, or not in view. When it is first installed, you adjust the position according to green light.

The EA401/EA402 will remind the driver before entering a dangerous driving status. The human retina will become less and less sensitive to the light outside, the artificial intelligence software inside the system is detecting the status continuously, and it will give an audible alarm to remind the driver take a rest.

The EA401/EA402 can also detect a distracted driver, such as talking with back-seat passengers, adjusting dashboard controls, reading, texting, picking up items on the floor, and give audible reminders to prevent accidents .

The EA401/EA402 response time is 2-3 seconds (2 seconds in highway mode, 3 seconds in urban settings.) Detecting items like looking at the mirror for too long, the alarm reaction time is 5 to 7 seconds, and then three short alarms will sound. The retina shrinks smaller and smaller in the 8 seconds before people enter an unconscious state, so the system can sound the alarm before it is too dangerous.

V. Components

The device is composed of a main control unit and a power cord (direct to battery.) A cigarette lighter adapter is also included.



1. Green light, (indicate the eye open or close)
2. Infrared light, (appears red in the dark)
3. Lens
4. Case
5. Speaker
6. 360°turning ball
7. Pedestal
8. Cigarette plug & Battery wiring

VI. Installation

To install on the dashboard: Clean the mounting surface in your car. Remove the round magnet from the box, remove the paper protector and stick to the top surface of the dashboard. The EA401/EA402 has a metal base. Connect the power cord to car cigarette lighter. The EA401/EA402 will begin to work after being powered on, now you can adjust the position according to the state of the green light facing you. After the green light is on, move your face around a small amount, if the green light stays on, that means the installation is good.

The USB type wire can connect directly to a GPS or GPRS system. The output signal is a 3.3 volt logic signal that asserts when the alarm trips.

The secondary power cord can wire directly to 12V power.

The angle between the driver and the camera should be less than 20 degrees.



VII. How to adjust the sensitivity and volume

Since people have different expectations for the driver fatigue alarm, the sensitivity is adjustable, this prevents many false alarms. We have 4 levels of sensitivity for your choosing. The recommended level is medium sensitivity.



- Max sensitivity: levers 1 & 2 both in the down position, testing level
- High sensitivity: lever 1 up, lever 2 down, this has some tolerance for looking around.
- Medium sensitivity: lever 1 down, lever 2 up, typical use.
- Low sensitivity: levers 1 & 2 both in the up position, only detects a trance or sleep.

Each of the 4 level's minimum alarming time is 2 seconds, the difference is the reaction time for the eye's closing or looking around.

- Max Audio: levers 3 & 4 both in the down position
- Medium Audio: lever 3 up, lever 4 down
- Low Audio: lever 3 down, lever 4 up
- No Audio: levers 3 & 4 both in the up position

VIII. Power requirements

- Automobile power can range from 8 to 36 Volts, suitable for both 12V and 24V car batteries.
- Very low power consumption, average current is less than 100mA in 12V systems and 60mA in 24V systems, similar with leakage from the battery.

IX. Attention:

- Do not open or repair the device.
- Do not operate the system while driving.
- Please handle carefully, do not drop.
- Do not use cleaning agents to clean the machine.
- Keep away from water or moist conditions.
- Do not rip, bend or squeezed the wiring.
- The EA401/EA402 does not recognize a person who has only one eye, white eyebrows, rough scars or wrinkles around eyebrows.
- If the temperature in the car is too high the EA401/EA402 may enter a sleeping mode to avoid damage, the system will re-start when cool.
- If the temperature is well below freezing, the device may not start immediately; wait for the cabin to warm up.

X. Product History

Researchers at Carnegie-Mellon University, working with the National Highway Traffic Safety Administration, developed the PERCLOS algorithm to measure eye closure rates.

XI. Highway Safety Group special legal statement:

Driver fatigue alarm system is only a warning product, and does not absolutely guarantee your driving safety. Please be advised that EA401/EA402 is not responsible for any driving accident.

XII. Warranty

EyeAlert™ Driver Fatigue systems come with a one (1) year limited warranty. The Highway Safety Group warrants EyeAlert™ products to be free from workmanship and materials defects including the enclosure, camera and electronics. The Highway Safety Group will cover 100% of the replacement cost for the first year. The Highway Safety Group does not warranty installation. This limited warranty does not cover replacement parts not approved in writing by The Highway Safety Group or if the EyeAlert™ is modified in anyway not approved by The Highway Safety Group in writing.

All implied warranties, including, without limitation, implied warranties of merchantability, fitness for a particular purpose, and non-infringement, are hereby expressly disclaimed. In no event shall The Highway Safety Group be liable to any person or business entity for any special, direct, indirect, punitive, incidental or consequential damages arising out of or in connection with the use of EyeAlert™ product, including, without limitation, any lost profits or business interruption even if The Highway Safety Group has been specifically advised of the possibility of such damages whether based on contract, tort, strict liability or otherwise. Because some states do not allow the exclusion or limitation of liability for consequential or incidental damages, the above limitation may not apply to you.

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